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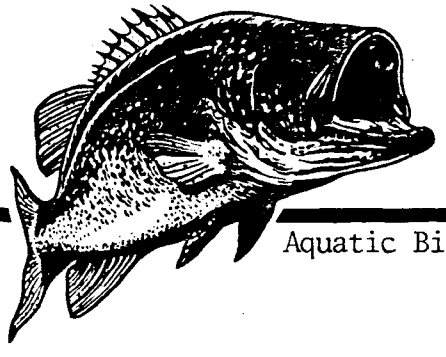
ILLINOIS NATURAL HISTORY SURVEY

COMPARATIVE ANALYSIS OF FISH COMMUNITIES IN IMPOUNDMENTS

Aquatic Biology Section
Technical Report

Peter B. Bayley
Principal Investigator



Annual Report
Federal Aid Project F-46-R

Aquatic Biology Technical Report 1985(2)

COMPARATIVE ANALYSIS OF FISH COMMUNITIES IN IMPOUNDMENTS

Annual Report
F-46-R
1 January 1984 to 31 December 1984

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January 1985

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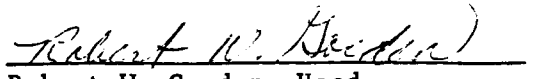

Robert W. Gorden, Head
Aquatic Biology

Project F-46-R, Comparative Analysis of Fish Coomunities in Impoundments, was conducted under a memorandum of understanding between the Illinois Department of Conservation and the Board of Trustees, University of Illinois. The actual research was performed by the Illinois Natural History Survey, a division of the Department of Energy and Natural Resources. The project was supported by Federal-Aid (Dingell-Johnson) funds as prescribed under the Federal Aid in Fish Restoration Act and was performed in compliance with its provisions. The form, content, and data interpretations made in this report are the responsibility of the University of Illinois and the Illinois Natural History Survey, and not that of the Illinois Department of Conservation.

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COMPARATIVE ANALYSIS OF FISH COMMUNITIES IN IMPOUNDMENTS

STUDY 101. Comparative analysis of fish communities in lakes and reservoirs.

Job 101.1. Microcomputer installation/data encoding.

The eight microcomputer systems scheduled for use by Illinois Department of Conservation personnel were delivered in late June. The first computer class was held at the Illinois Natural History Survey in July; five District Biologists and Mr. Jim Mick, Springfield, attended and took charge of their equipment. The two remaining District Biologists went through a similar process later.

Conservation personnel were taught how to assemble the computer components and how to enter data into the General Manager data base. In addition to manuals provided by Apple Computer and General Manager, a manual prepared by Dr. Bayley and Mr. Austen was provided on the software. This manual will be improved and updated based on comments from District Biologists and as new software is added.

All seven District Biologists have been entering data collected during 1984. Minor problems, due to the learning process, have been solved over the telephone. Although the data entry program is working well, some conveniences will be added in January 1985 before the second and final batch of computers are delivered.

We have been pleased with the response of the District Biologists, all of whom are new to microcomputers; most have had no prior computer experience. Their ability to learn has been much less related to age than we expected.

Job 101.2. Gear evaluations.

The following gear calibrations have been completed:

Place	Time	Electroshocking	Gillnets
Braidwood Pond	Sep 1983	3	2
Utterback ponds	Sep-Oct 1983	4	3
INHS Annex ponds	Sep 1983	7	
Lake Sangchris	May 1984	1	1
Braidwood Pond	Jun 1984	2	1
Timber Lake, Carroll Lake	Sep 1984	2	4
Sam A. Parr ponds	Sep 1984	4	
INHS Annex ponds	Sep 1984	6	
Total		29	11

A data base system on the Prime 750 computer will be implemented in 1985 to facilitate analysis of calibration data.

Data on the efficiency of rotenone and detonating cord, resulting from the calibration process, have been analyzed. A paper on our experience with detonating cord was presented at the Midwest Fish and Wildlife Conference in Indianapolis in December and is summarized as follows:

Three blocked areas, comprising two coves (0.36 and 0.50 ha) and an exposed rip-rap shoreline (0.08 ha), were sampled using detonating cord. Mean depths ranged from 1-2 m. Marked fish, mostly caught from within their respective areas, were returned to their typical habitats prior to detonation. In the first cove sampled, in which the cord was spaced assuming an effective killing range of 3.5-4 m, only 6% of the 193 marked fish were recovered the same day. A subsequent electrofishing run and 3

ppm of rotenone revealed that a large number of fish had not been killed by the detonating cord. The density of cord was doubled in the second cove and in the rip-rap shore samples. First-day recoveries of marked fish were 26% and 6%, respectively. Total recoveries after 3 days were 35% and 39%, respectively. The second cove included some very small marked fish, which if excluded increased the recovery rate to 45%. Species differences were not detected between bass, shad, carp, bluegill, and green sunfish after the effect of length was taken into account. Poor recoveries were mainly attributed to ruptured swim bladders and body cavities. Of the fish collected at the surface shortly after detonation, 93% were found to have ruptured swim bladders. Recoveries of marked fish were lower for detonation samples than they were for 3-day rotenone samples, and the increased density of detonating cord resulted in a more expensive operation than for rotenone and detoxicant applications. However, the exposed shoreline would have been difficult to sample using rotenone. The use of detonating cord is a feasible alternative for estimating fish populations, providing that marked fish are used.

Job 101.3. Microcomputer programs: local data analysis.

A transfer of funds from underutilized equipment and travel budgets in Segment 1 into personal services allowed us to hire additional programmers late in 1984. We have therefore accelerated the arduous process of program development and testing.

Programs for (1) calculating and displaying PSD, YAR, and user-specified RSD, and (2) tabular output of length frequencies, mean weights, and relative weights (or relative condition factors) have been coded and are undergoing testing. A versatile selection criteria subroutine has been included so that any combination of samples from any subset of stations and species from a particular lake can be extracted and analyzed jointly from the data base. This process will be available in all the interface programs. We expect to distribute these two programs in early January to assist District Biologists with their annual report preparation.

Coding for additional tabular programs has begun. These programs will be used to calculate various combinations of catch per effort for: (1) a selected species and gear, by user-defined length groups (which can be entered to correspond to age groups); (2) a selected species, by user-defined length groups, summarized for each gear; and (3) a series of selected species, all lengths combined, summarized for each gear.

It will be possible to preview all tables on the screen prior to printing. All tables will have 95% confidence intervals and catch per effort for any table can be presented in terms of numbers or weight of fish per unit time. Future alternative presentations that relate to area sampled will depend on gear calibration results. If the calibration results are successful, more meaning can be attached to catch per effort data collected by using standardized sampling methodology.

A scheme for graphics and statistical analysis has been devised. The Forth language is extremely flexible, fast, and economical (spacewise) compared with Basic or Pascal. This is particularly true with graphics, as has been demonstrated with the grass carp stocking model by M. J. Wiley and colleagues. A recent version of Forth for the Apple II computers (ISYS Forth), which does not require hardware additions, has been developed by Robert Illyes. We have contracted with him to develop and fully document the graphics programs for this project. Double high resolution graphics will be developed on the screen, with a routine for dumping to the printer. We plan to produce length frequency distributions and variation of relative weight or condition by fish length.

When running tabular data programs that interface with General Manager, the user will have the option to save and label a variety of data sets in the 32 kilobytes available in the auxiliary memory. He will also have the option to save the information as text files on disk. Subsequently, using Forth, the files in auxiliary memory can be catalogued and selectively transferred to main memory for use in graphics output.

The optional disk-stored text files will be formatted for use with the S.P.S. statistical package.

In conclusion, this system will reduce to a minimum the necessity of continually entering General Manager mode to extract data sets from the data base.

Job 101.4. Main frame computers: data base management system.

Work has begun on a system to transfer data from the hierarchical General Manager data base, stored on Apple DOS formatted floppy disks generated by District Biologists, to a relational INFO data base on the Prime 750. The basic structure of the INFO data base has been designed.

Job 101.5. Data transfer system to the Department of Conservation.

No work was scheduled for this segment.

Job 101.6. Statistical analysis of results/final report.

No work was scheduled for this segment.